

## Department of Finance Revenue Estimating Models

The Department of Finance's Financial Research Unit maintains the models and does the analysis necessary to prepare the Revenue Forecast for the Administration. The unit is staffed by experienced professionals who are highly trained in quantitative analysis. They all have at least five years of experience performing quantitative analysis of revenue issues.

### **The Personal Income Tax Revenue Forecast**

Personal Income Tax (PIT) payments are made throughout the tax year via (1) wage and salary withholding, (2) estimated payments, (3) final payments, (4) miscellaneous payments, and (5) credits from prior years. The Franchise Tax Board (FTB) administers the Personal Income Tax Law and receives the estimated payments, final payments, miscellaneous payments, and credits. The FTB also issues refunds to those taxpayers who have overpaid their tax throughout the year. When the taxpayer requests that a tax overpayment (refund) be applied as an estimated tax payment for the following tax year, the FTB will apply that payment as a "credit from prior year."

The Employment Development Department (EDD) administers the laws relating to employers' withholding of personal income taxes from the taxpayer's wages. The amount of personal income tax paid through withholding is allowed as a credit against the taxpayer's personal income tax liability for the year that the amount was withheld.

The primary focus of Finance's PIT forecast is to determine how much tax revenue will be collected from approximately 15 million annual tax returns over a period of three fiscal years in the budget window.

### *Model Sources of Data*

Data on revenue collections comes from the FTB, the EDD, and the State Controller. Other data used to prepare the forecast comes from a variety of sources including the Department of Finance's Economic Research Unit, which prepares the economic forecast that underlies the revenue estimate, tax practitioners, state revenue forecasters outside California, and the federal government.

Regular contacts, particularly during forecast preparation periods, are maintained with federal revenue analysts as well as those in other states. In particular, a great deal of information and idea sharing occurs with New York, the Congressional Budget Office, and the Nelson A. Rockefeller Institute of Government, which compiles revenue information on all the states. Most recently, the topics of shared interest have been capital gains and an update on the trends of cash receipts.

The Franchise Tax Board (FTB) provides the following data:

- Each day, a notice of the revenues received is sent to the State Controller. Copies of this memo are provided to the Department of Finance daily. This information is merely total collections and refunds and does not distinguish between payment types.
- A monthly report, Report 102 is provided which details the collections by type of payment (i.e., final payments, withholding, etc.) and refunds. This report reflects all personal income tax receipts including those collected by State agencies other than FTB (e.g.,

withholding by the EDD), and provides the cash basis for the personal income tax forecast.

- Annually, the Research Bureau of the FTB compiles a stratified random sample of over 200,000 prior year returns. These records are then weighted to reflect all returns. To protect tax payer confidentiality, this sample of individual taxpayers is not used directly by Finance. Therefore, FTB aggregates the data by adjusted gross income class or average record before releasing the information. Although this limits the usefulness of the data to some extent, it does provide statistics on the number of returns, income, exclusions, deductions, credits, and tax liability by level of income. This data is generally received about 15 months after the end of the tax year. Recently FTB has been able to provide more timely partial samples from e-filed returns, which now represent a substantial portion of tax receipts.

The EDD provides the following data:

- Daily deposits of withholding receipts are reported to the FTB. Copies of these memos are provided to the Department of Finance.
- Prior to the Budget and May forecasts, EDD provides estimates of accounts receivable, year-end accruals, and other data as requested.

#### *PIT Simulation Model*

A microsimulation model forms the basis of the Department of Finance's PIT revenue estimates. Basically, the microsimulation approach uses a sample of detailed taxpayer information to forecast the tax liability over the years that impact the budget period.

The base year data, which is provided by the FTB, includes both aggregated tax return as well as weighted average return information from the last sample (currently the 2009 tax year). Data include the number of returns, income and deduction components, and credits by adjusted gross income class (or record) and taxpayer filing status (single, joint, head of household). From these we are able to simulate the adjusted gross income and taxable income for the base tax year. The tax rate schedules and credits (e.g., personal exemption credits and special credits) are then applied to derive the average tax liability by filing status and income class. By summing these liabilities we arrive at the estimated aggregate tax year PIT liability for the state.

#### *Forecast Base Year:*

The personal income tax revenue estimates are based on the latest year of sample tax data provided by the FTB. As noted previously under "Sources of Data", the FTB's Research Bureau compiles a stratified random sample of over 200,000 prior year returns and the data are generally available about 15-16 months after the end of the tax year. For example, the FTB transmitted the sample data for the 2009 tax year in March 2011. A hard copy of the data was also sent to Finance. The 2009 data then formed the basis (take-off point) for the May Revision forecast that was prepared in late April/early May 2011.

#### *Econometric Model – Components of Income and Deductions:*

In projecting forward, growth rates for the components of income and deductions are applied to the base year data to simulate the tax liability for future years. The growth rates are estimated using regression analysis based on variables of underlying economic activity provided by the Department of Finance's economic forecast. Explanatory (independent) economic forecast

variables include: California (CA) Total Population, CA Wages and Salary Income, CA Dividend Income, CA Interest Income, CA Proprietors' Income, S&P 500, and US Average Home Sale Price.

### *Capital Gains Income:*

Because of the difficulty of trying to model capital gains, Finance generally combines several methods of forecasting gains. This depends on the available data at the time of the forecast. Data include: prior period capital gains and losses (including estimates of the most recent period for which data has not yet been compiled), calendar year stock market performance, house price data, reports on sales of large California businesses (including large public offerings), Securities Exchange Commission data on sales by large stockholders of large California companies, and surveys of expectations by other forecasters, especially those in New York and the Congressional Budget Office.

There are two key forecast periods for cap gains: 1) prior year/current year and 2) long-term.

- 1) Prior year/current year:
  - a. In the short-term forecast, when Finance has prior and current year cash ( tax liability for capital gains tends to be paid through estimated payments and extension payments), but do not have subsequent tax return data, we run our overall liability model using a consensus of capital gains income growth expectations (discussions with other state and federal agencies). Once our model provides the output liability for the year in question we will then compare to total cash and re-adjust our capital gains estimate to fit overall cash.
  - b. Longer term (no cash) forecast: For any tax year forecast without cash to base a capital gains estimate we employ several analysis factors to estimate gains:
    - i. For the immediate few years we will base our forecast to a great extent on discussions with other state and federal government agencies who are also forecasting gains. From these we can put together a consensus forecast of the near term forecast period.
    - ii. We take into account the Department of Finance's Economic Research Unit's (ERU) forecast of S&P 500 growth going forward.
    - iii. For the growth forecast several years out and beyond we look at the growth in CA Personal Income (PI), as forecast by ERU, as well as the ratio of capital gains income to PI. If we apply PI growth to cap gains in the long-term, we may adjust the growth in order to hit the historical CG/PI ratio.

After deriving resident liability for a tax year, additional estimates for other liability categories (non-resident, previous & prior, Mental Health Services Fund (Prop 63), and fiduciary) are added to the base resident liability estimates to arrive at the total tax year liability.

### *Econometric Model – Cash Components:*

The next step after estimating the tax liability is to run a cash model, which estimates the components of cash collections. The model applies regression analysis and is based on historical actual accrued cash collections.

Cash receipts data is provided by the FTB by month and payment type. Withholding, estimated payments, final payments, miscellaneous payments, and refunds are totaled to arrive at net cash (referred to as accrued cash in the forecast).

We use regression analysis to determine the relationship between the various cash payments by quarter and certain economic data (for example, S&P 500 end-of-year value, quarterly wages) and tax data (tax liability and capital gains). Once the statistical relationship is estimated by regression analysis, that relationship is used to forecast the quarterly payments for future years. Separate regressions are used to estimate quarterly withholding, quarterly estimated payments, annual final payments, and annual miscellaneous payments. These individual estimates are then summed to arrive at total tax year cash (accrued cash).

Net liability is compared to accrued cash, that is, what is owed is compared to what was paid, and any differences between the two must be represented in future estimates. This ensures that the past pattern of difference between cash and liability is carried into the future estimates. The accrued cash estimate for the current year and beyond are then spread by month based on recent historical percentages.

#### *Accruals, Legislation, Proposals:*

The forecast must also account for recently enacted legislation, and tax proposals supported by the Administration. The enacted legislation estimates are provided by the FTB and Finance cashflows these by month and fiscal year based on historical payment trend.

For the forecast to be accurate revenues should be attributed to the proper fiscal year. FTB provides Finance with the latest accrual estimates. The FTB accrual report indicates the proportion of a fiscal year's withholding, estimated payments, final payments, other payments, and refunds that are attributable to the previous fiscal year. Finance estimates accruals in the out years by applying FTB's most recent estimate to the DOF estimates for these payment categories.

#### *Post Forecast:*

Upon completing a forecast an ongoing process of monitoring begins which allows one to track the accuracy of the last forecast and to replace the prior estimates with actual receipts as they become available. These updates prep the forecast documents for the forecast ahead. Policymakers are kept abreast of revenue collections on a daily basis in order that any changes to the forecast resulting from a shortfall or increase in collections can be incorporated in the decision making process.

### **Sales and Use Tax Forecast**

The Sales and Use Tax revenue forecast is generated using revenue forecasting models developed and maintained by the Department of Finance. The forecast is updated twice a year and released with the Governor's Budget by January 10 and the May Revision by May 14. Each forecast includes adjustments for any legislative, judicial, or administrative changes, as well as for recent cash results.

The Department of Finance's Economic Research Unit, national economic forecast and California economic forecast is the starting point for Finance's Sales and Use Tax forecast.

The sales tax forecast uses a multiple-regression model to determine the statistical relationship between quarterly taxable sales amounts and various economic variables provided by the Economic Research Unit. Once the statistical relationship is determined, that relationship is used, together with the Economic Research Unit's forecast of the relevant economic variables, to forecast taxable sales, by quarter, for several years in the future. The model currently uses the following variables, developed by the Economic Research Unit:

- \* California wages and salaries
- \* California unemployment rate
- \* U.S. vehicles
- \* California housing permits
- \* U.S. Consumer Goods Deflator

Once a forecast for quarterly taxable sales is done, these figures are multiplied by the various tax rates applicable to forecast revenues for each fund for each quarter. Additionally, estimates of tax rate changes for the diesel sales tax are made. This tax rate is adjusted annually pursuant to the tax swap legislation enacted in 2010. An accrual estimate is done by comparing the estimate for July to mid-August cash receipts attributable to the prior year with July to mid-August cash receipts received in the following year that are attributable to the current year. Then, the sales and use tax forecast is adjusted upward for accounts receivable collections and refunds, the net of which is currently estimated at \$200 million per year. Lastly, new legislation and any other known factors that would result in a change to cash receipts are estimated and added to the forecast.

### **The Corporation Tax Revenue Forecast**

The corporation tax revenue forecast is prepared two times a year beginning with the Governor's Budget forecast (in December - released on January 10th), and the May Revision forecast (in May) just prior to the passage of the budget bill in June. Special forecasts may be prepared at times of financial crisis. The primary focus of this effort is to determine how much tax revenue will be collected from approximately 700 thousand business entities over a period of three fiscal years—the budget window.

On a daily and monthly basis the Franchise Tax Board (FTB) provides Finance with the following reports which are used initially to develop and then track the accuracy of the tax revenue forecast: Report of Daily Tax Revenues and Refunds (Daily Cash), Preliminary Month-End Cash, Final (Monthly) Comparative Collections Report, and Monthly Revenue by the Type of Payment (101 Report). Additionally, prior to the Governor's Budget Forecast (December) and the May Revision (May), the FTB provides DOF with latest actual and preliminary income and special adjustments data that must be reflected in the upcoming forecast. In some cases FTB's past data is projected out into the future by Finance based on taxable profits estimates.

Revenue data from the FTB reports do not provide all the necessary information for completing a forecast. Since corporate profits are a function of the economy, the economic forecast is the main driver in determining taxable profits. The Department of Finance's Economic Research Unit prepares a detailed national and California economic forecast prior to each revenue forecast. This forecast includes many standard economic variables that are used to develop the corporation tax forecast for the out years.

The first step in the forecast process is to ensure that monthly cash received since the last forecast replaces the estimate values. This is an initial indicator of how well the forecast did. For example, if the cash received was lower than forecast, we would try to ascertain the cause of the shortfall and determine whether the shortfall was likely to be persistent.

The next step is to estimate corporation taxable profits. The current regression is as follows:  $\log(\text{California Taxable Profits}) = c + \log(\text{U.S. Pretax Economic Profits}) + \log(\text{California Nonagricultural Employment}) + \text{AR}(1)$ . The log refers to the natural log. Taking the natural log of a series has a deflating effect on the series. It does not eliminate the upward trend in the data but it can straighten the trend in the data so that it is better fitted by a linear model. The “c” term is the Y intercept, and the predicted value when the values of the independent variables are zero. It is necessary for linearity and to ensure the best fit for the data. The AR(1) term, an autoregressive term, is frequently included in a regression as a remedy to the problem of Serial Correlation or Auto Correlation—where an error term is not independent but related to the one previous. If this condition exists and is uncorrected, the model looks better than it actually is. The Durbin-Watson statistic is a good indicator of the existence of serial correlation. This particular specification was chosen after running a multitude of regressions with different specifications and choosing the one with the best fit. A widely used econometric measure of goodness-of-fit, the minimum Akaike Information Criterion, was employed to determine which of the different possible specifications provided the best fit for the data.

The regression output—taxable profits attributable to California corporations—becomes the basis for determining the liability side to the forecast equation. There are two sides to the forecast which must be reconciled in order to arrive at accurate estimate. On the liability side, net tax liability—what is owed—must be determined. This is done by applying the tax rate to taxable profits and making qualified deductions. The second side of the equation is the cash side. Net cash receipts—the revenue collected—is recorded and matched with net calculated liability. Variances must be accounted for in future estimates.

On the liability side, taxable profits multiplied by the tax rate for C corporations of 8.84 percent is gross taxable liability. This gross liability estimate is overstated as a portion of the taxable income is from Subchapter S Corporations (S corps) which are taxed at the lower rate of 1.5 percent. A downward adjustment is made to the gross tax liability to account for income earned by S Corporations, Limited Liability Companies, and Limited Partnerships. From this “adjusted” gross tax liability net operating losses, credits, bank surcharge, alternate minimum tax, the minimum tax, and net transfers, are deducted (or added) to arrive at a calculated estimate of net tax liability. This is the calculated net liability which will likely differ from the net tax liability reported on the tax return. The average of the historical difference is included in the forecast net taxable profits in the out years.

The next step is to look at the cash side of the equation. Cash receipts data is provided by the FTB by month and payment type. Estimated payments, final payments, and refunds are totaled to arrive at net cash (referred to as accrued cash in the forecast). Net liability is compared to accrued cash, that is, what is owed is compared to what was paid, and any differences between the two must be represented in future estimates. This ensures that the past pattern of difference between cash and liability is carried into the future estimates. The accrued cash estimate for the current year and beyond is spread by month based on recent historical percentage.

Besides these “regular payments” the FTB receives additional revenue compliance and audit activity. These “other payments” are payments not categorized as estimated payments, final payments, or refunds. These primarily represent receipts from prior year activity. Since this

money cannot be associated with an income year liability, it must be forecast on historical values with essential input from FTB on expected changes to audit and compliance activity. Other Revenues are added to the final payments category.

The forecast must also account for recently enacted legislation. The enacted legislation estimates are provided by the FTB. Finance will then cashflow the estimated impact of legislation by month and fiscal year based on historical payment trend.

Some cash payments are received in a fiscal year that are really attributable to a prior fiscal year (For example, the payment accompanying a return that is filed on extension. Even when a return is filed on extension, the payment is due on the normal due date for the return (March 15<sup>th</sup> for calendar year corporations). Thus, cash payments need to be attributed to the proper fiscal year. This adjustment is done by accruing revenue from one fiscal year into a prior fiscal year. The FTB provides the DOF with the latest accrual estimates. The FTB accrual report indicates the proportion of a fiscal year's estimated payments, final payments, other payments, and refunds that are attributable to the previous fiscal year. DOF estimates accruals in the out years by applying FTB's most recent estimate to the DOF estimates for these payment categories.

All forecasts of monthly cash are on an agency basis, based on the agency's receipts. The final authority for cash receipts and disbursements for the state is the Controller. Controller cash and agency cash, while close, will often differ due to differing cutoff dates. When Controller cash becomes available we switch to actual Controller cash.

The corporation fiscal year tax revenue forecast is the total of regular payments plus other payments plus enacted legislation plus accruals for July of that particular fiscal year through June of that fiscal year.

Upon completing a forecast an ongoing process of monitoring begins which allows one to track the accuracy of the last forecast and the replace the prior estimates with actual receipts as they become available. These updates prep the forecast documents for the forecast ahead. Policymakers are kept abreast of revenue collections on a daily basis in order that any changes to the forecast resulting from a shortfall or increase in collections can be incorporated in the decision making process.

## **Insurance Tax Forecast**

The insurance tax survey is the basis of forecast for this revenue source. Survey forms are mailed to a sample of insurance companies annually, usually around late August or early September. More than 100 companies actually responded to the 2011 Confidential California Insurance Gross Premiums Tax Survey. The companies respond by indicating the percentage of year-over-year growth they expect to experience during the forecast period for each line of insurance they sell. From the survey results, the year-over-year change in total premiums for the current calendar year and the following calendar year for the sampled companies are computed, by individual line of insurance and for all lines taken in total.

The year-over-year percentage changes for all lines of insurance from the survey results are used to forecast the growth in the tax liability for the current calendar year and thereafter. Quarterly payments and final payments are estimated from the forecasted total insurance tax liability based on recent historical trends for these payment types relative to the total tax liabilities. Detailed monthly cash receipts from these payment types are developed from these estimated quarterly

and final payments based on recent monthly payment patterns. The resulting estimated monthly cash receipts are then tabulated in details by months and in totals by fiscal years.

The tax from surplus lines brokers, ocean marine, retaliatory, the miscellaneous collections, and refunds are administered by the Controller. They are not covered by the estimates from the insurance tax survey, and must be computed separately. These are relatively minor elements of the total revenue and are estimated usually from historical trends.

In 2006, the Board of Equalization ruled that the gross insurance premiums tax should be levied on premiums paid, not premiums written (this case is often referred to as the "Cal-Auto" case). This decision will ultimately lead to significant refunds being paid to many insurance companies. Based on the latest inputs from the California Department of Insurance staff, the revenue impact of this decision is updated as needed. The updated impacts of the Cal-Auto case are then incorporated into the estimated monthly net cash receipts.

### **Forecast for Excise Taxes on Cigarettes and Alcoholic Beverages**

Revenue data for these two taxes come from the Board of Equalization (BOE) and the State Controller. Other data incidental to the preparation of the forecast come from a variety of sources including the Department's Demographic Research Unit, the Federal Government, and the media.

To estimate the tax revenue from cigarettes, the prior years' consumption of cigarettes in packs is first determined based on data published in the BOE's annual report. Per capita consumption for the year is then computed by dividing the total consumption by the State's population for the 18-through-64 age group. The most recent per capita consumption rate is compared to prior years' per capita consumption rates. The elasticity impact of price increases and social trends are then factored in, and a forecast of the ongoing trend in per capita consumption is then made. Adjustments to consumption are made for known changes in state or federal tax rates. Total cigarette consumption estimates are derived for the forecast period by multiplying the per capita estimates by the latest population estimates. From the total consumption estimates for cigarettes, the current tax rates are then applied to arrive at the forecasted tax revenues from cigarettes.

To estimate tax revenue from alcoholic beverages, the prior years' consumption of alcoholic beverages in gallons is first determined from the BOE's annual report. Average year-over-year growth rates for the consumption of alcoholic beverages for the recent years are computed based on the BOE's alcohol consumption data. The computed average growth rates in recent years are then used to estimate the yearly consumption of alcoholic beverages in the future years, unless other available information available suggests otherwise. The current tax rates for various alcoholic beverages are then applied to forecasted consumption of alcoholic beverages in gallons to arrive at the forecasted tax revenues.

Once the revenue forecast for the total cigarette and alcohol taxes are prepared, the agency and Controller cash flows are estimated by allocating the forecasted fiscal year totals to each month based on the historical patterns for monthly receipts.

### **Pooled Money Interest Income Forecast**

Revenue data for Pooled Money Interest income primarily comes from the Controller's office. The Controller's office prepares a quarterly report entitled "Quarterly Allocation-Pooled Money Investment Account Earnings". This report shows the amount the General Fund had invested in



the Pool for the quarter, as well as the interest rate earned. On a monthly basis, the Controller also reports the cash receipts from this income source as well as various others in its Statement of General Fund Cash Receipts and Disbursements.

The forecast for pooled money investment earnings is calculated using forecasts for the following three variables: total pool balances, the General Fund share of the pool, and quarterly pool yield. Total Pool balances are projected forward based upon the most recent trends, expectations regarding the State's external borrowing plans, and other significant factors that could influence pool holdings (such as large court-ordered payments). The Investable Resources Unit of the Department of Finance estimates the amount of external borrowing the State will undertake in the budget year.

A forecast for the General Fund share of the Pool is developed using much of the same information used to forecast total Pool balances. In particular, the forecast for the General Fund share reflects expectations regarding the timing and length of periods when all of the State's external borrowing will be required to meet cash flow needs and hence will not be available to be invested and accrue interest.

The forecast of the Pool's yield is based on the forecast of the Federal Funds rate by the Department of Finance's Economic Research Unit. As would be expected, these rates follow similar trends, although the Pool's yield tends to lag changes in the Federal Funds rate (This is probably due to the fact that only a portion of the PMIA investments are redeemed each quarter; hence, a proportion of the portfolio always reflects investments made in earlier periods.)

General Fund balances of the Pooled Money Investment Account are derived by multiplying the General Fund share of the Pool by the total Pool balance. This General Fund balance is then multiplied by the forecast PMIA yield rate to calculate accrued interest earnings. Accrued earnings by quarters are then converted to monthly cash transfers based on recent historical patterns.